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NAVAL NUCLEAR ARMS REDUCTION -

FIXING THE US NAVY'S ACHILLES' HEEL

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PERESTROIKA AND THE US NAVY

The dramatic political changes in Eastern Europe in 1989 and Mikhail Gorbachev's continued commitment to perestroika and glasnost in the Soviet Union have raised the hopes of people everywhere that world peace may be at hand. The disintegration of the Warsaw Pact, the poor performance of the Red Army in Afghanistan, the perilous state of the Soviet economy and serious internal ethnic conflicts have drastically reduced the perceived threat which the USSR poses to NATO. As a result, many NATO members are contemplating reductions in defense budgets and military forces. West Germany, Great Britain, the Netherlands and Belgium have all recently announced plans for smaller forces in the near future.[1]

In the US, Congress and the media are nearly unanimous in demanding reductions in defense expenditures while suggesting a variety of ways to spend the anticipated "peace dividend."[2] President Bush appears to be vying with Gorbachev to announce bigger troop cuts in Europe and several separate arms reduction talks are in progress.

Almost lost amid this euphoria is the fact that the strategic and conventional forces of the Soviet Union remain formidable. Blackjack bombers, Delta IV class submarines with SSN-23 ballistic missiles, Tbilisi class aircraft carriers and SS-18 Mod V land-based ballistic missiles are stark testimony to the Soviet commitment to modernize an already-powerful military force.[3] Also clouding the optimism of some westerners is the Soviet Union's Byzantine system of political succession which could produce a reactionary successor to Gorbachev.

The disparity between hope and reality in global politics and military power has produced caution among American military leaders,

particularly regarding the pace and scope of arms reduction. This cautious attitude is especially evident in the Navy. The heavy capital investment and lengthy construction time which naval ships and submarines require have always made naval leaders reluctant to cut shipbuilding programs.

Compounding this normal naval caution are the searing memories of the problems of the 1970's which today's senior naval leaders possess. While the US Navy demobilized after the Vietnam War and scrapped hundreds of World War II vintage ships, the USSR built the world's largest navy and organized a potent challenge to America's control of the sea. By the end of the 1970's, the US Navy had ships that were too undermanned to safely put to sea and lacked the weapons, tactics and supplies necessary to ensure victory over the Soviet Navy.

The contrast between the US Navy of 1979 and the US Navy of 1989 could hardly be more dramatic. The Reagan buildup restored the tools of war to the Navy, along with its confidence and morale. Today, there is little doubt that the US Navy has a wide margin of superiority over its Soviet counterpart. Having expended enormous effort and treasure to regain naval supremacy, US naval leaders are, naturally, reluctant to sacrifice that hard-won advantage.

However, in the current climate of reduced budgets, arms control negotiations and public perception of a diminished threat, the US Navy appears destined to grow smaller. For the same reasons, naval arms control negotiations are not likely to be avoided much longer. The USSR has argued that if it is willing to negotiate regarding its advantage in land-based forces, then the US should be willing to negotiate its advantage in sea-based forces. A growing number of Americans think the US should at least talk to the Soviets about

naval arms.[4]

The most fruitful area for US-Soviet naval arms negotiations appears to lie in cruise missiles and nuclear weapons. Succeeding paragraphs will review the nuclear weapons inventories of the two superpowers (excluding ballistic missiles), the advantages and disadvantages of nuclear war-at-sea, Tomahawk and the current positions of the US and USSR on naval arms control. Finally, several proposals will be offered as potential US Navy negotiating positions and verification difficulties will be discussed.

US/USSR NAVAL NUCLEAR WEAPON INVENTORIES

Appendices 1 and 2 list Soviet and American naval nuclear weapons, excluding ballistic missiles. Comparison of the two tables reveals a wide disparity between the two superpowers in the diversity of their naval nuclear weapons. The US Navy has only <u>one</u> missile that can carry a nuclear warhead (Tomahawk Land Attack Missile (TLAM-N)) while the USSR has <u>twelve</u> ship-, submarine- or land-launched missiles (SSN-3,7,9,12,14,15,16,19,21,22,24; SSC-1B) and <u>five</u> air-launched missiles (AS-2,3,4,5,6) that can be nuclear armed and used against ship, submarine or land targets. In addition, the Soviet Navy has a rocket-launched anti-submarine nuclear depth charge (SUW-N-1) and four surface-to-air missile systems (SAN-1,3,6,7) that can use nuclear warheads.

Besides Tomahawk, which will be discussed in detail in a later paragraph, the US Navy has one air-dropped nuclear depth bomb (B-57) and two types of air-dropped tactical nuclear bombs. The Soviet Navy has three types of nuclear-armed torpedoes (the US has none), two types of air-dropped tactical nuclear bombs, an air-dropped nuclear

depth bomb, a small stockpile of nuclear mines and some naval artillery shells for an older 152MM gun.

Not listed in the table of US naval nuclear weapons are three systems that have quietly been or are being withdrawn from service: the nuclear version of the Terrier surface-to-air missile (SAM); the Rocket Thrown nuclear Depth Charge version of the ship-launched Anti-Submarine Rocket (ASROC-RTDC); and the Submarine-launched Rocket (SUBROC) with a nuclear depth charge.[5] Terrier and ASROC-RTDC have been retired while SUBROC will complete retirement not later than 1991.[6] Terrier's replacement is the conventional Standard Missile 1 and 2 (SM-1,2). A nuclear version of SM-2 (SM-2N) was in development but has been cancelled for cost and operational reasons.[7] ASROC retains a MK-46 conventional torpedo but, while ASROC will be given a vertical launch capability and matched with the new MK-50 conventional torpedo, it is not destined to receive a new nuclear version.[8] SUBROC was to have been replaced by the new Sea Lance Anti-Submarine Stand-Off Weapon which would initially carry a MK-50 conventional torpedo and, possibly later, a nuclear depth charge but Secretary of Defense Cheney has announced plans to cancel the entire project.[9] A new nuclear depth/strike bomb (B-90 NDSB) is in development to replace the B-57 but it faces funding difficulties. No other nuclear weapon development programs are listed in the unclassified literature. [10]

On the Soviet side, the SSN-3C which was a submarine-launched nuclear land attack version of the SSN-3 appears to have been retired, the AS-3 is being withdrawn from service and, when the Sverdlov class cruiser completes retirement in the next few years, nuclear artillery shells will leave the Soviet inventory.[11] Information on new Soviet naval nuclear weapons, other than SSN-X-24,

cannot be obtained from unclassified sources.

Unclassified sources also provide only estimates of the total number of naval nuclear warheads, with one exception: the US has announced it intends to purchase 758 TLAM-N missiles although only a few hundred have been delivered so far.[12] One unclassified source estimates that (excluding ballistic missiles), the USSR has 2960 naval nuclear weapons and the US has 2500.[13]

In discussing naval nuclear weapons, it is important to note that Tomahawk and almost all Soviet nuclear-capable torpedoes and missiles (except SSN-15,21,24 and AS-3) have both nuclear and conventional versions. This complicates verification of any naval nuclear arms pact.

NUCLEAR WAR-AT-SEA

The use of nuclear weapons in a naval war-at-sea has some advantages, chief of which is their enormous destructive power when compared to conventional weapons of the same size. Thus, a given level of damage can be inflicted by a much smaller strike force using nuclear warheads. In anti-submarine warfare (ASW), Soviet use of double pressure hulls in submarine construction and the increased separation between the two hulls evident in the Oscar and Typhoon classes, have compromised the destructive capability of the US air- and ship-launched MK-46 torpedo. Until the MK-50 conventional torpedo is introduced, nuclear depth bombs may be the only air-launched weapons that are effective against newer Soviet submarines. Also, acoustic homing torpedoes have the potential to be decoyed by acoustic countermeasures while a "dumb" nuclear depth charge is impervious to such devices.

Nuclear weapons also possess numerous disadvantages from the US perspective. The US Navy concept of "defense in depth" against air, surface, and submarine threats is designed to attrite enemy launch platforms and missiles by using several layers of mutually supporting defensive systems. Under this scheme, few, if any, missiles will reach their targets; if the few that hit have conventional warheads, US damage control training, techniques and equipment should restore combat capability in a short time. However, if the few that hit are nuclear, damage control will be meaningless and the elaborate defense in depth will have been wasted. Nuclear weapons occupy scarce magazine space on US naval vessels, replacing conventional weapons which are more likely to be used in combat. Nuclear weapons also place a significant administrative load on operational units due to greatly increased security, training, handling and paperwork requirements.

Nuclear explosions affect the environment in a variety of ways that adversely impact the warfighting performance of combatants on both sides. In the case of an airburst, the fireball itself will block the passage of electro-magnetic energy for a few seconds. If the burst occurs at high altitude, it can distort the ionosphere and disrupt electro-magnetic propagation from several minutes to several hours, depending on frequency.[14] Even more significant for US forces, an airburst generates an electro-magnetic pulse (EMP) which can permanently damage unshielded solid state electronics equipment. The US Navy makes far greater use of solid state electronics than the Soviets who are more reliant on older, but more EMP-resistant, vacuum tube equipment.[15]

In the case of a surface or sub-surface burst, the reverberation of the explosion disrupts acoustic propagation in a phenomenon called

"blueout." Depending on ocean bottom composition and topography, "blueout" can last for several minutes in the high acoustic frequency range and for several hours for low acoustic frequencies.[16] If the target submarine is not destroyed in the attack, ASW forces may find it impossible to re-acquire the target. Since US acoustic detection systems such as the seafloor Sound Surveillance System (SOSUS), surface ship- and submarine-towed array sonar systems and air-dropped sonobuoys are much more capable than comparable Soviet systems, degraded acoustics from "blueout" would have a disproportionately negative impact on US ASW and submarine warfighting capability.

Another important question is whether a nuclear war that is initiated at sea can be contained at sea or whether it must inexorably expand to a larger exchange of nuclear weapons. The fact that nuclear war-at-sea would be fought almost entirely by combatant platforms and personnel with few, if any, civilian casualties and little collateral damage to land or property has produced an opinion that the most likely arena for a future nuclear war is the sea. To counter this opinion, the US has said that it would not feel obligated to constrain a nuclear war to the sea and that, if attacked, it intends to retaliate against land targets.[17]

From the Soviet perspective, it is questionable whether the US Navy could be defeated without resort to nuclear weapons to achieve significant damage with the few hits that are likely to be scored. Similarly, in the undersea battle, the less effective Soviet acoustic detection systems would necessitate assured destruction of the western submarines that are found.

TOMAHAWK

Aside from its ballistic missiles, the US Navy has only one nuclear-armed missile, the Tomahawk nuclear land attack missile (TLAM-N). The versatile Tomahawk has two anti-ship versions, each with a different type of conventional warhead and 250 NM range; three conventional land attack versions of 700 NM range, one with a single warhead and two with multiple submunitions; and the nuclear land attack version with a 1500 NM range.[18]

The major advantage of Tomahawk is that it distributes the Navy's offensive striking power against land and ship targets over a very large number of platforms (about 200 ships and submarines) as opposed to the fifteen or so aircraft carriers on which offensive striking power was previously concentrated. This profusion of launch platforms greatly increases the number of attack axes which an enemy must defend and multiplies the number of targets that the enemy must defeat in order to avoid absorbing serious damage. TLAM-N may also deter Soviet initiation of a nuclear war-at-sea by threatening retaliation against Soviet air and naval bases. Another Tomahawk feature is that one of its launch systems, the armored box launcher (ABL), can be bolted to the deck of nearly any ship, including a merchant ship.[19] This provides the US with a "breakout" capability wherein it could produce and store ABL's in peacetime, mounting them on additional ships just before or after the outbreak of hostilities.

The Intermediate Nuclear Forces (INF) Treaty has potentially added another role to Tomahawk's repertoire - flexible response in Europe. With the retirement of the Pershing II intermediate range nuclear missile and of the Ground Launched Cruise Missile (GLCM) under INF, NATO land forces are limited to artillery shells,

air-dropped bombs and the aging, short-range Lance missile to provide a nuclear response to an overpowering Soviet conventional attack in Europe. TLAM-N can extend NATO's striking range and place Soviet second echelon forces and rear support units at risk during the early stages of war.

American satisfaction with the capability and versatility of Tomahawk was reflected in the Chief of Naval Operations' speech to the Leningrad Naval School on 12 October 1989, "I understand that the Soviet Union views the U.S. sea-launched cruise missile capability with concern. You, as military men and learned strategists, can appreciate it when I say that it is intended to concern you."[20]

Tomahawk's nuclear land attack capability has some problems, however. In the current international political environment, it is hard to believe that the US would expend nuclear weapons on the newly liberated eastern European countries. In the Third World, superior US firepower and world opinion would almost certainly prescribe a conventional response to a small-scale nuclear attack launched by an irrational leader or by terrorists. This leaves only the Soviet Union and possibly China as targets for US nuclear weapons. From the Soviet perspective, if a US nuclear weapon explodes on Soviet territory, it matters little whether it came from a sea-launched cruise missile (SLCM), a ballistic missile, a bomb or an air-launched cruise missile. To the Soviets, a TLAM-N attack on the Soviet Union is most definitely a strategic attack. It is likely that the US would react the same way to an SSN-21 attack on US territory. Thus, if TLAM-N is viewed by the most likely target nation as a strategic weapon, it becomes the fourth leg of a western strategic "quadrad" that includes ICBM's, submarine-launched ballistic missiles (SLBM's) and land-based bombers (with ALCM's, Short Range Attack Missiles (SRAM's) or bombs).

Because of TLAM-N's single, low yield warhead and moderate range, some theorists have classified it as a "theater nuclear weapon", a separate category between tactical and strategic nuclear warfare.[21] Such a weapon, it is hoped, would provide political and military leaders with an option to use, or to threaten to use, nuclear weapons short of an all out strategic nuclear exchange. However, if the only realistic targets for US nuclear weapons are the Soviet Union and China, both of which are strategic targets, then the concept of theater nuclear warfare ceases to be meaningful.

Nuclear weapons have been available for forty-five years in hundreds of forms but haven't been fired in anger since Nagasaki. During this period, the US fought the fourth and fifth bloodiest wars in its history, accepting defeat in Vietnam and a draw in Korea without resorting to its overwhelming advantage in nuclear weapons.[22] History thus demonstrates that the nuclear threshold is enormously high.

If the United States were to take the extraordinary step of crossing the nuclear threshold and using nuclear weapons against Soviet territory, is there any realistic distinction between a low yield Tomahawk and a high yield Trident? Not really, which makes TLAM-N a redundant strategic nuclear weapon. Thus, since TLAM-N duplicates existing US strategic nuclear capability but still represents a credible threat to the USSR, it has potential as a bargaining chip in naval arms control negotiations.

CURRENT NEGOTIATING POSITIONS

UNITED STATES

Naval arms control measures fall into two categories: inventories (platforms, weapons, etc.) and operations (operating area limitations, restricted movements, etc.). The US position on naval arms control is clear and unambiguous: "There is nothing in it for us. We can only lose," the words of Mr. Edward L. Rowney, President Bush's chief arms control negotiator.[23]

The rationale for the US position has been summarized by the Chief of Naval Operations in several speeches: America's special situation as a maritime power, unlike the USSR which is a continental power; the location of all but two allies overseas; the difficulty of reinforcing and resupplying allies without assured control of the sea; dependence on seagoing trade and on imports of oil and strategic minerals; and traditional support for freedom of navigation on the sea.[24] The national interests of the US require a strong Navy.

In dealing with the more specific issue of naval nuclear weapons, many in the US believe that the best way to deter a nuclear war-at-sea is to have an assured nuclear retaliation capability against land and sea targets. This nuclear retaliation capability should be spread over as many platforms as possible to prevent future enemies from concentrating on a few "bullseye" targets like aircraft carriers. It is feared that de-nuclearizing the US and Soviet navies through arms control would actually increase the risk of nuclear war-at-sea by providing the USSR an incentive to secretly develop a "breakout" naval nuclear arsenal.[25]

With respect to sea-launched cruise missiles (SLCM's), the US

has maintained that any arms control agreement "would be unverifiable without unacceptably intrusive inspections."[26] This is so because: it is difficult to distinguish between nuclear and conventional versions of SLCM's; it is easy to convert from one SLCM version to the other by changing warheads; it is hard to identify SLCM and warhead production facilities; and it is hard to count the number of SLCM's carried on some launch platforms.[27] Even if these problems are solved by inspections, it is feared that changes could be made to warheads or magazine loads, either in port or at sea, once the inspectors have departed. Congress has weighed into the SLCM discussion with stipulations in its INF Treaty ratification and FY-90 Defense Authorization Bill that future agreements on strategic arms limitations not restrict current or future US non-nuclear cruise missiles.[28]

In START negotiations, the US has been forced to take a position on SLCM's, but not on overall naval forces, because of Soviet insistence on discussing SLCM's. The US has insisted that SLCM's not be counted in START warhead agreements but has offered a non-binding declaration of SLCM numbers while both sides seek improved verification measures.[29]

What is ironic about the firm US opposition to any form of naval arms control is the fact that the US Navy has been quietly undergoing de-nuclearization, as described earlier. This has been done with no public relations fanfare and with no attempt to obtain any concessions from the Soviets. Publicity was apparently shunned to avoid having to submit to intrusive verification of the retirement of the weapons, to keep from being drawn into negotiations for additional naval arms reduction and to maintain the option to deploy replacement nuclear weapons systems in the future.[30] Introducing

replacement nuclear systems, however, seems unlikely in view of congressional and DoD cancellations of SM-2N, nuclear vertical launch ASROC and Sea Lance.

One of the most controversial US positions on naval nuclear weapons is its policy of neither confirming nor denying (NCND) the presence of nuclear weapons on its ships and submarines. NCND was adopted to enhance deterrence by forcing an enemy to consider all combatant ships as potentially nuclear-armed, to improve weapons security by preventing saboteurs from concentrating on just a few vessels and to facilitate port calls in countries which have restrictions on the presence of nuclear weapons.[31] Because of the recent retirement without replacement of several nuclear weapons, however, many US combatant ships are no longer even nuclear-capable much less nuclear-armed. These include the following classes: Knox frigates; Perry FFG's; Leahy and Daniels (Belknap) CG's; and Adams, Farragut and Kidd DDG's. Even though budget cuts will force early retirement of most of these ships (except Perry and Kidd classes), it appears the Navy needs to modify its NCND policy. Otherwise, it will find itself applying NCND to a large number of ships that are no longer capable of employing nuclear weapons.

Domestic and international pressure is building against the US refusal to consider naval arms negotiations and against its NCND policy.[32] This pressure is likely to become intense if, as expected, START and Conventional Forces in Europe (CFE) Treaties are concluded in 1990.

SOVIET UNION

The Soviets have four objectives in naval arms control: keep

opposing navies as far from Soviet territory as possible; de-nuclearize the maritime threat to Soviet territory; offset western technological advantages; and eliminate imbalances in naval forces.[33] To achieve these objectives, the Soviets have offered a variety of proposals aimed at both inventories and operations. From the US perspective, most of these proposals are unacceptable, offering virtually nothing to the US while seeking major advantages for the USSR. It is possible that the intent of these proposals is to provoke the US to respond and so be drawn into a naval arms control dialogue.

In the field of naval nuclear weapons, the Soviet position before the Malta Summit called for limits of 400 nuclear SLCM's and 600 conventional SLCM's with agreement to be reached either in association with START or as part of a separate naval arms conference.[34] Since SALT II, the Soviets have consistently limited their cruise missile proposals to eliminating "long range cruise missiles" and have defined "long range" as in excess of 600KM (about 325NM).[35] For naval cruise missiles, this definition includes only TLAM-N, SSN-21 and SSN-X-24, thus allowing the Soviets to retain a formidable arsenal of shorter-range air-, surface- and submarine-launched nuclear cruise missiles. No agreement on naval nuclear weapons or cruise missiles seems possible under this definition.

Changes in the Soviet negotiating position, however, are taking place. At Malta, Gorbachev reportedly called for elimination of nuclear depth charges, torpedoes, bombs (on aircraft carriers), anti-submarine rockets, anti-aircraft missiles and cruise missiles.[36] It remains unclear, however, how comprehensive his concept of "cruise missiles" is. During the Moscow Ministerial Conference in February, 1990, the Soviets accepted the US SLCM proposal in the START talks to

declare the number of deployed SLCM's separately from START and without verification.[37] The USSR apparently did this to remove an obstacle to achieving a START Treaty but it also reiterated its desire to devise some forum to discuss naval arms control.

NAVAL NUCLEAR ARMS CONTROL PROPOSALS

Previous paragraphs have argued that nuclear war at sea is more advantageous to the USSR than to the US; that the USSR, with its large and diverse naval nuclear arms inventory, has significantly more systems to eliminate under nuclear arms control than does the US; and that TLAM-N, as a redundant strategic weapon, is a useful bargaining chip for the US. Consequently, a treaty that eliminates or significantly reduces Soviet naval nuclear weapons (excluding ballistic missiles) appears to be in the best interests of the United States. However, before discussing proposals for naval nuclear arms control, it is necessary to state what is not contained in these proposals:

1. Limits on naval operations: such limitations would have great impact on the US, small effect on the USSR and would seriously inhibit US pursuit of its global interests.

2. Restrictions on conventional cruise missiles: each country has reasons to avoid negotiations on non-nuclear cruise missiles: for the US, such restrictions have already been prohibited by Congress; the Soviet Navy is dependent on cruise missiles because of its lack of sea-based aircraft.

3. Limits on ballistic missiles or long range ALCM's (USAF ALCM, USSR AS-15 and AS-X-19): these are part of START.

4. Limits on launch platforms: age and budget reductions are

leading to retirement of platforms and declining numbers of vessels in both navies.

5. A simple trade of TLAM-N for SSN-21 and SSN-X-24: the US would forfeit a system that poses a credible threat to the USSR and which is planned for almost 200 ships and submarines. The USSR would forfeit two systems (one of which is still in development) that are probably less effective than TLAM-N and which will be deployed on only a handful of modern submarines.

The following proposals are offered as potential US negotiating positions for naval nuclear arms control discussions and include both current and future naval nuclear weapons:

Proposal 1: Eliminate all US/USSR naval nuclear weapons including: air-, surface- and submarine-launched anti-ship, ASW and land attack missiles; land-launched anti-ship and ASW missiles; surface-to-air missiles; ASW rockets and depth charges; torpedoes; bombs carried by land- and sea-based naval and maritime aircraft; mines; and naval artillery shells.

US Perspective: This proposal would remove the most serious threats to the US Navy (nuclear destructive power and adverse environmental effects) while allowing it to retain significant conventional distributed offensive striking power with TLAM-C and carrier aircraft. NCND would cease to be a policy issue.

Verification of this proposal would be difficult and intrusive and there would be concern about the consequences should the Soviets cheat and retain a nuclear capability. The USSR might seek to circumvent a treaty by stockpiling withdrawn nuclear weapons for rapid return to service in the event of a crisis. Destruction of these weapons as they are withdrawn would eliminate this possibility

and the INF Treaty has set a useful precedent for such a destruction program. Another possible treaty evasion would be for Soviet Naval Aviation to borrow nuclear bombs from Soviet Strategic Aviation for use at sea. However, the necessity to fly very close to targets to use gravity bombs would most likely result in annihilation of the attacking aircraft prior to weapon release by the US Navy's defense in depth. A third concern would be Soviet development of clandestine nuclear weapons production, storage and distribution facilities although such a network would risk exposure by US verification measures or a defector. Should the USSR somehow field a nuclear arsenal for a surprise naval attack, it would still face retaliation from conventional US forces and the strategic triad. A final objection to this proposal would be the loss of TLAM-N's potential contribution to flexible response but this objection has already been shown to have flaws.

Soviet Perspective: The USSR would relinquish its most effective means of defeating US naval forces but might consider that to be an acceptable trade in order to eliminate TLAM-N. The Soviets might also seek, as a rider to this proposal, to ban or limit conventional long range (>600KM) cruise missiles and to limit operating areas for US aircraft carriers. However, because of the Soviet Navy's substantial conventional capability, the US should be able to constrain a naval arms treaty to nuclear weapons. The USSR is also certain to want some type of accommodation on naval nuclear weapons of US allies (Great Britain and France) and this will complicate negotiations.

Proposal 2: Eliminate US/USSR ship- and submarine-launched nuclear weapons, nuclear mines and land-launched nuclear anti-ship and ASW missiles. This proposal excludes naval nuclear air-delivered

weapons: air-to-surface missiles, bombs and depth charges.

US Perspective: This proposal would significantly reduce the nuclear threat to the US Navy while allowing it to retain a nuclear capability for its carrier- and land-based aircraft. The US would have substantial distributed offensive striking power with TLAM-C and nuclear-armed carrier aircraft which, along with the strategic triad, should deter Soviet initiation of a naval nuclear war. NCND would only be an issue for aircraft carriers.

A disadvantage for the US in this proposal is that Soviet naval aircraft would retain a powerful nuclear threat to US naval forces while the US would entirely relinquish its major bargaining chip in TLAM-N. TLAM-N's contribution to flexible response, if accepted as a valid role, would also be lost. Verification of this proposal would be intrusive but less critical than in Proposal 1. Because each side would retain a substantial nuclear capability, there would be less incentive to cheat. Under this proposal, US naval forces would face less of a threat than they do today but some US policy makers would feel that too much is sacrificed for this improvement.

Soviet Perspective: The USSR would likely view this proposal as an advantageous trade for TLAM-N and would be less insistent on obtaining other concessions. The Soviets are more likely to accept this proposal than Proposal 1.

Proposal 3: Eliminate US/USSR ship-launched nuclear weapons, nuclear mines and land-launched nuclear anti-ship and ASW missiles. Ship-launched nuclear weapons include: ASW, anti-ship, land attack and surface-to-air missiles; ASW rockets; torpedoes; and naval artillery shells.

US Perspective: Some of the nuclear threat to US naval forces

would be removed while the US would retain TLAM-N in submarines along with nuclear weapons for carrier- and land-based aircraft. TLAM-N would still be available for deterrence and flexible response. NCND would not be an issue for surface ships (except aircraft carriers). Verification would be less of a problem in this proposal because, with so many naval nuclear weapons still in service, there would be little incentive to cheat.

However, in this proposal the US would give up a large number of surface TLAM-N platforms with no impact on the major Soviet threats to the US Navy - submarines and land-based aircraft. Soviet surface forces pose little threat to today's US Navy because they lack air cover and because of the defensive weapons, equipment and tactics developed by the US Navy during the 1980's. Some advocate this proposal as an interim naval arms control agreement to get the process started, to build a sense of trust between the two sides and to develop effective verification techniques. Unfortunately, the US gives up too much for too little gain to make this proposal a worthwhile alternative.

Soviet Perspective: The USSR would likely accept this proposal if it were the only one offered since it would reduce the TLAM-N force by about half with little loss of effective Soviet naval power. They would probably prefer an agreement that totally removed TLAM-N.

VERIFICATION

The key to naval nuclear arms control, and the most difficult problem to solve, is acceptable verification of treaty provisions. Differentiating between nuclear and conventional variants of cruise missiles and determining how many weapons of certain types are

carried in submarine torpedo rooms, surface ship vertical launch systems (VLS) and aircraft carrier bomb magazines are just a few of the major problems.[38] Shielded warheads that foil radiation detectors, insertable nuclear components (INC) that convert conventional warheads into nuclear weapons and changing warheads or magazine loads either in port or at sea after an inspection are some of the sophisticated methods that could be used to circumvent a treaty.[39] The US is particularly sensitive to surrendering technology to the Soviets through both data exchanges and access to closely guarded equipment and spaces on naval vessels.[40] The US (and probably the USSR as well) will not tolerate active emissions from arms control monitoring equipment that could be used to track ships and submarines at sea.

Verification measures fall into four categories: National Technical Means (NTM) such as satellites and ground listening stations; cooperative measures such as data exchanges and unencrypted telemetry data from weapons tests; on-site inspections (OSI) which can be unrestricted, selectively limited to specific times and locations or challenges to the other party to demonstrate that prohibited activity is not taking place; and monitoring, in which personnel and equipment are permanently stationed at specified locations.[41] Verification literature distinguishes between "adequate" verification and "effective" verification. Adequate verification means treaty violations will be detected in time to take corrective action before the violation poses a threat; effective verification means violations will be detected almost as soon as they occur.[42] Effective verification is more difficult to achieve than adequate verification and is of particular concern to the US because an open society tends to minimize the potential for cheating on treaties, a

condition which does not yet exist in the more secretive USSR.

Despite the difficulties, if the full array of verification techniques and technology are applied to naval arms control, it should be possible to achieve adequate verification of a treaty. Verification provisions should include:

1. Banning development of insertable nuclear components.[43]

2. Detailed data exchange on numbers, types, launch platforms and technical characteristics of nuclear weapons and warheads.[44]

3. Full use of NTM.

4. Monitoring perimeters and entry/exit portals of nuclear weapon production facilities and storage areas.[45]

5. Use of electronic tags. Active tags that emit signals for monitoring could be placed on weapons from the time they are produced until they leave a weapons storage area to be loaded on a vessel at which time they would be replaced by passive tags.[46]

6. Telemetry collection of weapons tests to ensure prohibited systems are not developed. Such test telemetry must be unencrypted.[47]

7. Selective on-site inspection of weapons production facilities, weapons storage areas, ships and submarines to ensure prohibited weapons are not present.[48]

8. Unscheduled challenge inspections of conventionally-armed naval units at home and in overseas ports to ensure conventional warheads and weapons have not been replaced by nuclear weapons since the previous inspection.[49]

9. Challenge inspections of facilities not covered by the treaty but where prohibited activity is suspected. Caveats would be attached to this provision to ensure suspicions are allayed without allowing the challenger to go on intelligence gathering expeditions or to harass the challenged nation.[50]

10. Permanent observation detachments at major naval bases. To a degree, this would substitute uniformed Soviet personnel for the secret agent networks suspected of already operating at most US bases.

11. Supervised elimination of prohibited weapons as is being done for the INF Treaty.[51]

12. Supervised destruction of nuclear warheads banned by the treaty. This would be an important step to ensure that existing warheads are not simply stockpiled for future crises or weapons development programs but are actually eliminated. One method would be to dismantle the warheads and then segregate the nuclear material under strict controls. Another would be to reprocess suitable weapons grade nuclear material for use in nuclear reactors for naval propulsion and civilian power generation.[52]

13. Random selection of operational warheads for dismantling to ensure they are strictly conventional and not designed for INC's.

14. Enlistment of international agencies to assist in monitoring and inspections. The International Atomic Energy Agency already monitors several nuclear facilities in the US and USSR as part of the Non-Proliferation Treaty and their role could be expanded.[53]

US opponents of naval arms control will object to providing the USSR access to naval weapons magazines although such access will be reciprocal. While this access is certainly intrusive, it is not far beyond what is employed under INF and what is likely to be used for START. Despite preventive measures, cheating by using warhead shielding to hide nuclear material and changing warheads or weapons loads at sea would still be possible. It would be risky, though, for the USSR to develop an alternative nuclear production, storage and

distribution system since the US might well discover such a system through a comprehensive verification program.[54] As each country gains more experience in verification through INF, START and CFE and as verification technology improves, adequate verification of a naval nuclear arms control treaty should become more and more feasible.

CONCLUSION

The USSR has a larger and far more diverse inventory of non-SLBM naval nuclear weapons than does the US. Nuclear war-at-sea would reduce US advantages in sophisticated defense in depth, acoustic technology, state-of-the-art electronics and damage control. While nuclear weapons would augment the striking power of US aircraft and cruise missiles and compensate for possible US torpedo weaknesses, nuclear war-at-sea would allow the Soviets to inflict greater, and possibly war-winning, damage on US naval forces. On balance, the US has far more to lose than gain by seeing a naval war shift from conventional to nuclear weapons. Tomahawk is a versatile and effective weapon which, in its nuclear land attack version, drives the Russians to distraction. However, TLAM-N duplicates missions performed by the strategic triad and is therefore redundant.

The current US naval arms control negotiating position is to avoid any discussion of the subject. The Soviets have offered a variety of proposals but, in general, these have sought significant gains for the USSR while offering little to the US. This has been particularly evident in the 600KM range specification for those cruise missiles which the Soviets wish to include in arms negotiations. However, the USSR appears eager to reach a naval arms control treaty and has recently moderated its position.

The US Navy has been progressively de-nuclearizing itself over the past few years with no commensurate reductions by the Soviets. Now, TLAM-N and the international political climate present an excellent opportunity to remove the Soviet nuclear threat to the US Navy. The US could conceivably eliminate the nuclear arsenals of both navies (excluding ballistic missiles) or, less comprehensively, remove nuclear weapons from ships and attack submarines. The key to such a treaty would be to achieve an acceptable level of verification. Adequate verification should be possible through a comprehensive series of measures although such a program would probably be intrusive. The US fears the transfer of technology from this intrusion but would be compensated by gaining greater access to the secretive Soviet Navy.

Arms control negotiations will gain enormous momentum in 1990 if START and CFE Treaties are signed. If this does occur, the Navy will feel increasing pressure to go to the conference table. Assuming this happens, the Navy must be prepared to reach an agreement that will enhance the security of the United States and the prospect for world peace. The Navy can only be prepared if an active dialogue is undertaken within the service. This paper is offered to stimulate discussion of the topic.

APPENDIX 1

SOVIET NAVAL NUCLEAR WEAPONS[1] (Excluding Ballistic Missiles)

WEAPON	LAUNCH PLATFORM[2] (Launchers/Reloads)	WARHEAD	RANGE (NM)	REMARKS
SSN-3A/B	11 Echo II (8/0) 13 Juliett (4/0) 4 Kresta I (4/0) 4 Kynda (8/8)	Nuclear or Conv	250	Anti-ship; 3C land attack retired; 3A sub-launched; 3B ship-launched.
SSN-7	9 Charlie I (8/0)	Nuclear or Conv	35	Anti-ship
SSN-9	6 Charlie II (8/0) 1 Papa (10/0) 17 Nanuchka I (6/0) 14+ Nanuchka III (6/0) 1 Sarancha (4/0)	Nuclear or Conv	60	Anti-ship
SSN-12	3 Kiev (8/16) 1 Mod Kiev (12/?) 3+ Slava (16/0) 15 Echo II (8/0) 1 Juliett (4/0)	Nuclear or Conv	300	Anti-ship, possible land attack.
SSN-14	1 Kirov (2/12) 7 Kara (8/0) 10 Kresta II (8/0) 10+ Udaloy (8/0) 21 Krivak I (4/0) 11 Krivak II (4/0)	Nuclear depth bomb or Conv torpedo	30	Ship-launched ASW weapon. Only 1st Kirov has system. May have anti-ship role. Some sources dispute nuclear capability.
SSN-15	6 Typhoon 5+ Oscar 1 Papa 9/6 Charlie I/II 4+ Akula 2+ Sierra 6 Alfa 16/7 Victor I/II 23+ Victor III	Nuclear depth bomb	22	Sub-launched ASW weapon. Uses torpedo tubes. May be on Tango SS. May have anti-ship role.
SSN-16	6 Typhoon 5+ Oscar 4+ Akula 2+ Sierra 23+ Victor III	Nuclear depth bomb or Conv torpedo	54	Sub-launched ASW weapon. Uses torpedo tubes. May have anti-ship role.
SSN-19	3+ Kirov (20/0) 5+ Oscar (24/0)	Nuclear or Conv	300	Anti-ship; possible land attack.

SSN-21	4+ Akula 2+ Sierra 23+ Victor III 3+ Mod Yankee	Nuclear	1600	TLAM-N equivalent. Launched from torp tubes. Yankee's being modified.
SSN-22	10+ Sovremennyy (8/0) 10+ Tarantul III (4/0)	Nuclear or Conv	60	Anti-ship
SSN-X-24	1 Mod Yankee (12/0)	Nuclear	2200	New SLCM under development.
SSC-1B	Land sites	Nuclear	250	Anti-ship. Variant of SSN-3.
SUW-N-1	3 Kiev (2/?) 2 Moskva (2/?)	Nuclear depth bomb or Conv torpedo	16	Ship-launched ASW rocket.
AS-2	70 Badger C (2/0)	Nuclear or Conv	100	Anti-ship, land attack.
AS-3	30 Bear B/C (1/0)	Nuclear	250	Land attack, anti-ship. Being retired
AS-4	305 Backfire (2/0) 60 Blinder B (1/0) 60 Bear G (2/0)	Nuclear or Conv	170	Anti-ship, land attack.
AS-5	70 Badger C (2/0) 150 Badger G (2/0)	Nuclear or Conv	100	Anti-ship
AS-6	150 Badger G (2/0)	Nuclear or Conv	250	Anti-ship, land attack.
SAN-1	4 Kresta I (4/44) 4 Kynda (2/24) 6 Mod Kashin (4/36) 12 Kashin (4/36) 8 Kanin (2/16) 8 SAM Kotlin (2/16)	Nuclear or Conv	11	SAM
SAN-3	3 Kiev (4/72) 1 Mod Kiev (4/72) 2 Moskva (4/44) 7 Kara (4/72) 10 Kresta II (4/72)	Nuclear or Conv	16	SAM
SAN-6	3+ Kirov (12/96) 3+ Slava (8/64)	Nuclear or Conv	43	SAM
SAN-7	10+ Sovremennyy (2/40)	Nuclear or Conv	15	SAM
Type 53 torpedo	All submarines, Many ships	Nuclear or Conv	11	ASW and anti-ship

Type 65 torpedo	6 Typhoon 5+ Oscar 4+ Akula 2+ Sierra 23+ Victor III	Nuclear or Conv	55	Anti-ship
ET-80 torpedo	All submarines	Nuclear	11	ASW and anti-ship. Nuclear version of electric torpedo.
Bombs (1000, 750 KG)	Blackjack Backfire Blinder Bear Badger MIG-21 Fishbed MIG-23 Flogger MIG-27 Flogger D SU-17/20/22 Fitter SU-24 Fencer	Nuclear		Tactical general purpose. Bombers can also carry 3 types of strategic bombs.
Depth Bomb	100 MI-14 Haze 90 KA-25 Hormone 70 KA-27 Helix 90 BE-12 Mail 45 IL-38 May 60 TU-142 Bear F	Nuclear		ASW. KA-25,27 ship based, others land based.
Mines	Submarines	Nuclear		Small stockpile
152 MM Gun	11 Sverdlov	Nuclear or Conv	15	Being withdrawn as class retires.

NOTES:

1. Unclassified sources vary widely in some areas such as whether certain weapons have a nuclear capability, what weapons are carried on certain platforms, how many units of certain platforms are in service (particularly aircraft), and how many weapons of certain types are carried on some platforms. Sources used include:
    Jane's Fighting Ships 1989-90
    Jane's All the World's Aircraft 1987-88
    Jane's All the World's Weapons Systems 1987-88, 1985-86
    Combat Fleets of the World 1988-89
    The Military Balance 1989-1990
    Soviet Military Power: Prospects for Change - 1989
    Nuclear Weapons Data Book, Vol. IV: Soviet Nuclear Weapons
    Nuclear Warships and Naval Nuclear Weapons: A Complete Inventory

2. a. "+" indicates class still in production or modification.
   b. Mix of weapons in submarine torpedo magazines and aircraft bomb bays varies.

APPENDIX 2

US NAVAL NUCLEAR WEAPONS[1]
(Excluding Ballistic Missiles)

WEAPON	LAUNCH PLATFORM[2] (Missiles)		WARHEAD	RANGE (NM)	REMARKS
Tomahawk Land Attack Missile	44+	Los Angeles (12)	Nuclear or Conv	1500(N) 700(C)	758 nuke versions to be bought. Future launch platforms: 107 subs, 91 ships. Not all units in listed classes have been converted yet.
	37	Sturgeon (8)			
	1	Narwhal (8)			
	4	Iowa (32)			
	4	Virginia (8)			
	1	Long Beach (8)			
	15+	Ticonderoga (20)			
	31	Spruance (8)			
Depth Bomb (B-57)	373	P-3	Nuclear		Dual purpose air dropped ASW weapon and tactical bomb.
	140	S-3			
	137	H-3			
	212	USN A-6			
	54	USMC A-6			
	210	USN A-7			
	246+	USN F/A-18			
	186+	USMC F/A-18			
Bomb (B-43, B-61)	212	USN A-6	Nuclear		General purpose tactical bomb. B-28 retired, B-43 being withdrawn. F/A-18 does not carry B-43
	54	USMC A-6			
	210	USN A-7			
	246+	USN F/A-18			
	186+	USMC F/A-18			
	146+	USMC AV-8B			

NOTES:

1. Sources used include:
   Jane's Fighting Ships 1989-90
   Jane's All the World's Aircraft 1987-88
   Jane's All the World's Weapons Systems 1987-88, 1985-86
   Combat Fleets of the World 1988-89
   The Military Balance 1989-1990
   Nuclear Warships and Naval Nuclear Weapons: A Complete Inventory
   DMS Market Intelligence Reports - Missiles
2. a. "+" indicates class still in production or modification.
   b. Unclassified sources vary widely on number of aircraft in a class.
   c. Number of Tomahawk missiles varies for submarines (except Los Angeles class with vertical launch capability) and for Spruance and Ticonderoga classes with vertical launch capability.

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